

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A polymeric composition having antimicrobial properties, the polymeric composition comprising: a crosslinked chemical combination of (i) a polymer having side chains along a backbone forming the polymer, at least two of the side chains containing an amino group, (ii) an antimicrobial agent selected from the group consisting of metals, metal alloys, metal salts, metal complexes and mixtures thereof, and (iii) a crosslinking agent containing at least two functional groups capable of reacting with the amino groups.
2. (Currently Amended) The polymeric composition of claim 1 wherein: the polymer is a polyamide, and the polymer is synthesized by (i) reacting a monomer selected from the group consisting of unsaturated carboxylic acids, esters of unsaturated carboxylic acids, anhydrides of unsaturated carboxylic acids, and mixtures thereof, and a first amine to form an intermediate reaction product, wherein the first amine is selected from the group consisting of RR_1NH , RNH_2 , $RR_1NH_2^+$, RNH_3^+ and mixtures thereof, wherein R and R₁ can be the same or different and each contain between about 1 and 50 carbon atoms and are optionally substituted with heteroatoms oxygen, nitrogen, sulfur, phosphorus, or combinations thereof, and (ii) reacting the intermediate reaction product and a second amine to form the polyamide, wherein the second amine is selected from the group consisting of R_2R_3NH , R_2NH_2 , $R_2R_3NH_2^+$, $R_2NH_3^+$ and mixtures thereof, wherein R, R₁, R₂ and R₃ can be the same or different and each contain between about 1 and 50 carbon atoms and are optionally substituted with heteroatoms oxygen, nitrogen, sulfur, phosphorus, or combinations thereof, wherein multiple of the R, R₁, R₂, and R₃ are in vertically aligned spaced relationship along a backbone formed by the polyamide wherein one or more of R, R₁, R₂ and R₃ are substituted with an amino group.
3. (Original) The polymeric composition of claim 2 wherein R and R₁ are alkyl.

4. (Original) The polymeric composition of claim 3 wherein the first amine is tetradecylamine.

5. (Original) The polymeric composition of claim 2 wherein the second amine is a polyalkylene polyamine.

6. (Original) The polymeric composition of claim 5 wherein the polyalkylene polyamine is pentaethylenehexamine.

7. (Currently Amended) The polymeric composition of claim 2 wherein the monomer is selected from the group consisting of unsaturated dicarboxylic acids, esters of unsaturated dicarboxylic acids, anhydrides of unsaturated dicarboxylic acids, and mixtures thereof.

8. (Currently Amended) The polymeric composition of claim 7 wherein the monomer is selected from the group consisting of maleic anhydride, maleic acid esters, and mixtures thereof.

9. (Currently Amended) The polymeric composition of claim 2 wherein the antimicrobial agent is selected from the group consisting of chelated silver ions, silver metal, chelated copper ions, copper metal, chelated zinc ions, zinc metal and mixtures thereof.

10. (Currently Amended) The polymeric composition of claim 1 wherein: the polymer is a polyamide, and the polymer is synthesized by (i) reacting an α,β -unsaturated lactone and a first amine to form an intermediate reaction product, wherein the first amine is selected from the group consisting of RR_1NH , RNH_2 , $RR_1NH_2^+$, RNH_3^+ and mixtures thereof, ~~wherein R and R₁ can be the same or different and each contain between about 1 and 50 carbon atoms and are optionally substituted with heteroatoms oxygen, nitrogen, sulfur, phosphorus, or combinations thereof~~, and (ii) reacting the intermediate reaction product and a second amine to form the polyamide, wherein the second amine is selected from the group consisting of R_2R_3NH , R_2NH_2 , $R_2R_3NH_2^+$, $R_2NH_3^+$ and mixtures thereof, wherein R, R₁, R₂ and R₃ can be the same or different and each contain between about 1 and 50 carbon atoms and are optionally substituted with heteroatoms oxygen, nitrogen, sulfur, phosphorus, or combinations thereof, ~~wherein multiple of the R, R₁, R₂, and R₃ are in vertically aligned spaced relationship along a backbone formed by the polyamide wherein one or more of R, R₁, R₂ and R₃ are substituted with an amino group~~.

11. (Original) The polymeric composition of claim 10 wherein R and R₁ are alkyl.

12. (Original) The polymeric composition of claim 11 wherein the first amine is tetradecylamine.

13. (Original) The polymeric composition of claim 10 wherein the second amine is a polyalkylene polyamine.

14. (Original) The polymeric composition of claim 13 wherein the polyalkylene polyamine is pentaethylhexamine.

15. (Original) The polymeric composition of claim 10 wherein the lactone is 2(5H)-furanone.

16. (Currently Amended) The polymeric composition of claim 10 wherein the antimicrobial agent is selected from the group consisting of chelated silver ions, silver metal, chelated copper ions, copper metal, chelated zinc ions, zinc metal and mixtures thereof.

17. (Currently Amended) The polymeric composition of claim 1 wherein the crosslinking agent is selected from the group consisting of phosphines having the general formula (A)₃P, wherein A is hydroxyalkyl, and mixtures thereof.

18. (Currently Amended) The polymeric composition of claim 17 wherein the crosslinking agent is tris(hydroxymethyl)phosphine or tetrakis(hydroxymethyl)phosphine.

19. (Currently Amended) The polymeric composition of claim 1 wherein the antimicrobial agent is selected from the group consisting of chelated silver ions, silver metal, chelated copper ions, copper metal, chelated zinc ions, zinc metal and mixtures thereof.

20. (Currently Amended) The polymeric composition of claim 1, further comprising a second crosslinked chemical combination of (i) a second polymer having side chains along a backbone forming the second polymer, at least two of the side chains containing an amino group, (ii) a second antimicrobial agent selected from the group consisting of metals, metal alloys, metal salts, metal complexes and mixtures thereof, and (iii) a second crosslinking agent containing at least two functional groups capable of reacting with the amino groups, wherein the antimicrobial agent and the second antimicrobial agent are different.

21. (Currently Amended) The polymeric composition of claim 20 wherein: the polymer and the second polymer are a polyamide, and the polyamide is synthesized by (i) reacting a monomer selected from the group consisting of unsaturated carboxylic acids, esters of unsaturated carboxylic acids, anhydrides of unsaturated carboxylic acids, and mixtures thereof, and an amine, wherein the amine is selected from the group consisting of RR₁NH, RNH₂, RR₁NH₂⁺, RNH₃⁺ and mixtures thereof, wherein R and R₁ can be the same or different and each contain between about 1 and 50 carbon atoms and are optionally substituted with heteroatoms oxygen, nitrogen, sulfur, and phosphorus and combinations thereof, wherein one or more of R and R₁ are substituted with an amino group.

22. (Currently Amended) The polymeric composition of claim 20 wherein: the crosslinking agent and the second crosslinking agent are selected from the group consisting of phosphines having the general formula $(A)_3P$, wherein A is hydroxyalkyl, and mixtures thereof.

23. (Currently Amended) The polymeric composition of claim 20 wherein: the antimicrobial agent is selected from the group consisting of chelated copper ions, copper metal, and mixtures thereof, and the second antimicrobial is selected from the group consisting of chelated silver ions, silver metal, and mixtures thereof.

24. (Currently Amended) The polymeric composition of claim 20 wherein: the antimicrobial agent is selected from the group consisting of chelated copper ions, copper metal, and mixtures thereof, and the second antimicrobial is selected from the group consisting of chelated zinc ions, zinc metal, and mixtures thereof.

25. (Currently Amended) The polymeric composition of claim 20 wherein: the polymer and the second polymer are a polyamide, and the polyamide is synthesized by reacting an α,β -unsaturated lactone and an amine, wherein the amine is selected from the group consisting of RR_1NH , RNH_2 , $RR_1NH_2^+$, RNH_3^+ and mixtures thereof, wherein R and R_1 can be the same or different and each contain between about 1 and 50 carbon atoms and are optionally substituted with heteroatoms oxygen, nitrogen, sulfur, and phosphorus and combinations thereof, wherein one or more of R and R_1 are substituted with an amino group.

26.-44. (Canceled)

45. (Currently Amended) A polyamide material comprising:

(A) a crosslinked polymeric material formed by a process comprising:

(i) reacting a reaction mixture comprising a monomer selected from the group consisting of maleic anhydride, maleic acid esters, and mixtures thereof, and an amine one or more amines having the formula R-NH₂ to form an intermediate reaction product, wherein R contains between 1 and 50 carbon atoms and is optionally substituted with heteroatoms oxygen, nitrogen, sulfur, phosphorus, and combinations thereof; wherein at least a portion of the R groups are one amine has an R group substituted with an amino group; and

(ii) reacting the intermediate reaction product and the amine one or more amines to form a polyamide; and

(iii) reacting the polyamide with a crosslinking agent to from a crosslinked polymer, wherein the crosslinking agent includes at least two functional groups capable of reacting with amino groups; and

(B) copper ions, copper metal, or a mixture thereof.

46. (Canceled)

47. (Currently Amended) A polyamide material comprising:

(A) a polymer formed by a process comprising:

(i) reacting a reaction mixture comprising a monomer selected from the group consisting of unsaturated carboxylic acids, esters of unsaturated carboxylic acids, anhydrides of unsaturated carboxylic acids, and mixtures thereof, and an amine one or more amines having the formula R-NH₂ to form an intermediate reaction product, wherein R contains between 1 and 50 carbon atoms and is optionally substituted with heteroatoms oxygen, nitrogen, sulfur, phosphorus, and combinations thereof, wherein at least a portion of the R groups are one amine has an R group substituted with an amino group; and

(ii) reacting the intermediate reaction product and the amine one or more amines to form a polyamide; and

(B) an antimicrobial agent selected from the group consisting of a metal, a metal alloy, a metal salt, a metal complex, or and mixtures thereof.

48. (Cancelled)

49. (Currently Amended) A polyamide material comprising:

(A) a crosslinked polymeric material formed by a process comprising:

(i) reacting a reaction mixture comprising a monomer selected from the group consisting of unsaturated carboxylic acids, esters of unsaturated carboxylic acids, anhydrides of unsaturated carboxylic acids, and mixtures thereof, and an amine one or more amines having the formula R-NH₂ to form an intermediate reaction product, wherein R contains between 1 and 50 carbon atoms and is optionally substituted with heteroatoms oxygen, nitrogen, sulfur, phosphorus, and combinations thereof, wherein at least one amine has an R group is substituted with at least one amino group; and

(ii) reacting the intermediate reaction product and the amine one or more amines to form a polyamide; and

(iii) reacting the polyamide with a crosslinking agent to form a crosslinked polymer, wherein the crosslinking agent includes at least two functional groups capable of reacting with amino groups; and

(B) an antimicrobial agent selected from the group consisting of a metal, a metal alloy, a metal salt, a metal complex, or and mixtures thereof.

50. (Previously Presented) The polyamide material of claim 49 wherein the monomer comprises maleic anhydride, maleic acid esters, or mixtures thereof.

51. (Previously Presented) The polyamide material of claim 49 wherein the antimicrobial agent includes chelated silver ions, silver metal, chelated copper ions, copper metal, chelated zinc ions, zinc metal, or mixtures thereof.

52. (Canceled)

53. (Currently Amended) A crosslinked polymeric material formed from:

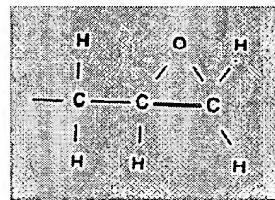
(A) a polyamide formed from a mixture which comprises:

(i) one or more monomers selected from the group consisting of maleic anhydride, maleic acid esters, and mixtures thereof; and

(ii) one or more amines selected from the group consisting of RNH_2 R-NH_2 , a polyalkylene polyamine, and mixtures thereof, wherein RNH_2 R-NH_2 and the polyalkylene polyalkylene polyamine each contain between 1 and 50 carbon atoms and are optionally substituted with heteroatoms oxygen, nitrogen, sulfur, phosphorus, or combinations thereof, wherein one or more of the selected amines is substituted with an amino group;

(B) one or more antimicrobial agents selected from the group consisting of metals, metal alloys, metal salts, metal complexes and mixtures thereof; and

(C) one or more crosslinking agents selected from the group consisting of aliphatic isocyanate compounds having 2 or more $-\text{N}=\text{C}=\text{O}$ groups; aromatic isocyanate compounds having 2 or more $-\text{N}=\text{C}=\text{O}$ groups; aliphatic aldehyde compounds having 2 or more $-\text{CHO}$ groups; aromatic aldehyde compounds having 2 or more $-\text{CHO}$ groups; phosphines having the general formula $(\text{A})_2\text{P}(\text{B})$ wherein A is hydroxyalkyl, and B is hydroxyalkyl, alkyl, or aryl; epoxy resins having end groups of the formula:



, and mixtures thereof.

54. (Currently Amended) The crosslinked polymeric material of claim 53, wherein the monomer comprises maleic anhydride mono-ethyl ether ester.

55. (Currently Amended) The crosslinked polymeric material of claim 53, wherein the one or more amines comprise tetradecylamine.

56. (Currently Amended) The crosslinked polymeric material of claim 53, wherein the one or more amines comprise pentaethylenehexamine.

57. (Currently Amended) The crosslinked polymeric material of claim 53, wherein the one or more antimicrobial agents comprise chelated silver ions, silver metal, or a mixture thereof.

58. (Currently Amended) The crosslinked polymeric material of claim 53, wherein the one or more antimicrobial agents comprise chelated copper ions, copper metal, or a mixture thereof.

59. (Currently Amended) The crosslinked polyamide material of claim 53, wherein the one or more crosslinking agents comprise glutaraldehyde.

60. (Currently Amended) The crosslinked polymeric material of claim 53, wherein the one or more crosslinking agents comprise a phosphine formed from the reaction of tetrakis(hydroxymethyl)phosphine tetrakis(hydroxymethyl)phosphonium chloride and trimethylamine.

61. (Currently Amended) The crosslinked polymeric material of claim 53, wherein the one or more crosslinking agents comprise tris(hydroxymethyl)phosphine.

62. (New) The polyamide material of claim 45, wherein the one or more amines comprise tetradecylamine and pentaethylenehexamine.